REMARKS

Claims 1-11 and 13-20 are pending in the present Application. Claim 1 has been amended, Claim 20 has been canceled, no new claims have been added, and Claims 16-19 are withdrawn, leaving Claims 1-11 and 14-16 for consideration upon entry of the present Amendment.

Claim 1 has been amended to include the limitations of Claim 20, canceled herewith. No new matter has been introduced with these amendments.

Reconsideration and allowance of the claims are respectfully requested in view of the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-11 and 20 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 4,071,369 ("Kurz") further in view of U.S. Patent No. 3,762,935 ("Leach"), U.S. Patent No. 3,942,990 ("Engstrom"), and U.S Patent No. 4,017,289 ("Hoda").

Kurz discloses a method for manufacturing porous ceramic products by mixing ceramic material which 1-35% of a fly dust containing silica and metal oxides and having a large specific surface area. Col. 4, lines 49-52. The fly dust contains a high proportion (75-92%) of silica (SiO_2) and different metal oxides such as MgO, Al_2O_3, and Fe_2O_3, and a specific fly dust having a composition of 70-75% SiO_2, 12-15% Al_2O_3, and 6-10% alkali. Col. 1, lines 31-45 and 57-59; Col. 3, lines 57-60. In Example 2, 0.2 % by weight of SiC (silicon carbide) has been added as an oxidizing agent. Col. 5, line 43 in Example 2. Kurz discloses a clay having a composition of 17-47% Al_2O_3, 50-70% silica, 10-20% alkali, and "some organic materials". Col. 5, lines 27-33. Kurz states that "*almost* all types of know clays" can be expanded by mixing with a homogeneous siliceous powder (i.e., "alkali", which is a material having the composition of a fly dust), and that oxidizing agents such as SiC can be added when bound to each grain of the "powder" to allow for a simultaneous reaction and uniform pore distribution. Col. 3, line 65 to Col. 4, line 6; *emphasis added.*

Leach discloses a closed or open cell foamed material. Col. 3, lines 38-40. It is described that the composition for making the article comprises aluminum hydroxide, aluminum oxide, glass frit, bentonite, metal powder, and phosphoric acid. Col. 3, lines 8-19. The glass frit

comprises 24-36% silica, 10-25% B_2O_5, 15-26% TiO_2, 15-20% Na_2O, and 3-7% K_2O, 4-5% Li_2O, 1-11% BaO, up to 3% Sb_2O_3, up to 10% ZnO, and up to 3% Fe. Col. 8, lines 42-50.

Engstrom discloses a method for the manufacture of foamed ceramics from a starting composition containing (1) at least one waste product rich in silica and containing readily oxidizable substances which, when heated, are themselves capable of producing uncontrollable pore formation and/or an undesirable melt, and (2) a strongly oxidizing agent. In the composition of Engstrom *et al.*, 0.1-0.5% pore-forming agent, e.g., silicon carbide may be used. Engstrom discloses that the in order for an acceptable foamed ceramic to be obtained the starting materials "*shall* have the following chemical composition": 60-75% SiO_2; *5-13% Al_2O_3 plus Fe_2O_3*; ca. 2% CaO; 0-6% MgO; and *10-15% Na_2O plus K_2O*. Col. 2, lines 38-50 (*emphasis added*).

Hoda discloses a bentonite clay having a composition consisting essentially of 57-78% SO_2, 13.8-23% Al_2O_3, 0-4% MgO, 0-5% Fe_2O_3, 0-2.5% CaO, 0-5.4% Na_2O, and 0-0.5% K_2O in weight percent. Col. 9, lines 34-36. It is *vital* that the bentonite clay have a cation exchange capacity of 100-200 meq/100 g to be of use. Col. 9, lines 29-31. Hoda also discloses that one particular bentonite clay, Gelwhite GP2492, can be vitrified into a homogeneous, useful opal glass whereas Bentonite 660 cannot. Col. 8, lines 49-51

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). "A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must "identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does." *Id.*

Claim 1 as amended is directed to a super light weight ceramic panel having closed pore structures produced by trapping carbon dioxide gas and oxygen gas, which is formed from a composition containing 90 to 98% by weight of an expandable clay mineral, 1 to 5% by weight of glass, and 1 to 5% by weight of silicon carbide, wherein the expandable clay mineral consists

essentially of 61.5 to 70% by weight of SiO_2, 15 to 20% by weight of Al_2O_3, 1 to 5% by weight of Fe_2O_3, 2 to 4% by weight of CaO, 1 to 3% by weight of MgO, 0.5 to 1.5% by weight of K_2O and 2 to 5% by weight of Na_2O.

Regarding the rejection of instant Claim 1 as amended over the combination of Kurz in view of Leach, Engstrom, and Hoda, and as thoroughly discussed in the previous Response filed August 21, 2008, neither Kurz, Leach, Engstrom, nor Hoda individually or in combination discloses the clay composition claimed in amended Claim 1 which comprises SiC in an amount of 1 to 5 wt%, and thus neither Leach nor Engstrom nor Hoda remedies the deficiencies of Kurz as the combination fails to teach all elements of the instant claims. Engstrom discloses SiC in an amount of 0.1 to 0.5 wt%, and Kurz discloses use of SiC in an amount of 0.2 parts by weight, but neither reads upon the claimed range of 1 to 5 wt%. For this reason at least, a combination of Kurz, Leach, Engstrom, and Hoda fails to render the claims prima facie obvious.

Applicants further respectfully assert that neither Hoda nor Kurz fairly suggests or teaches the further combination of Kurz, Engstrom and Leach with Hoda as suggested by the Examiner, such that one skilled in the art would neither be motivated to include the bentonite clay of Hoda in the composition of Kurz, nor do so with a reasonable expectation that the combination of these references would be successful. Applicants in particular note the Examiner's rationale on pp. 3-4, bridging paragraph, which states that an intended use of the bentonite is as an expanded material, and that Hoda provides necessary details to practice the invention of Kurz. Applicants contend that Hoda teaches just the opposite, and hence teaches away from a combination of the clay of Hoda with the expandable material of Kurz.

Kurz teaches that the pore forming evolution of gas takes place at a temperature of 900-1200°C. Kurz, Col. 7, lines 38-45. Though Kurz discloses that it is possible to expand *almost* all types of known clays, Kurz teaches that sintering temperature depends on the alkalinity of the clay, where low alkali clays sinter at higher temperatures (e.g., kaolin with 0% alkali and a sintering temperature of 1500-1600°C) and high alkali clays sinter at lower temp (e.g., feldspar with 17% K_2O which sinters at 1200°C). Co. 7, lines 18-33. Kurz states that the clay may be modified *if poor in alkali* (i.e., "fly dust", wherein it can also be admixed with minor quantities of water glass or alkali metal silicate, caustic soda, or the like), and likewise that unexpandable clays may be made expandable by inclusion of the appropriate composition fly dust. Col. 4, lines 17-45. Hoda, on the contrary, teaches vitrification of the composition at a temperature of

950-1200°C, and further that "if a clay comprises carbonate impurities [i.e., basic compounds] the clay can be washed in dilute acid solution (e.g. 5% HCl (aq.)) or the final glass product will be "seedy". Col. 3, lines 46-53.

Hoda also discloses that the composition of operable bentonite clays can vary but that it is "vital" to the utility of a particular clay that the clay have a cation exchange capacity of 100-200 meq/100g of clay. Col. 9, lines 25-30. It is further disclosed as an objective of Hoda that the clay is *modified* in composition prior to the vitrification of the clay to avoid formation of refractory crystal phases, by subjecting the clay of Hoda having a cation exchange capacity of 100-200 meq/100g of clay to an ion exchange process with an alkali metal cation (e.g., NaCl, KCl, where it is noted that only Na, K, Cs, Rb produce sound glass bodies) so that 3-5% by weight of Na_2O (or equivalents of other oxides) can be absorbed. Col. 2, lines 14-22 and 57-60; Col. 3, lines 59-65; Col. 4, lines 20-22.

Thus, one skilled in the art will appreciate that Hoda teaches that an operative clay composition has 1.) been acid washed, and 2.) ion exchanged to further change the composition by 3-5 wt% of Na_2O, K_2O, or other oxides. Col. 3, lines 65-67. Where the bentonite has not been ion exchanged, the performance in the context of Hoda is undesirable. In the Examples of Hoda, Gelwhite GP 2492 and Bentonite 660, both bentonite clays, were treated with acid, or acid washed followed by ion exchange. The non-ion exchanged GP 2492 was undesirably completely crystalline, whereas acid washed-only bentonites failed to provide a vitrified component. Col. 8, 32-62. Hence, Hoda teaches the necessity for washing with an acid, whereas Kurz teaches the opposite, i.e., inclusion of an alkali compound. These teachings run contrary, and hence Kurz and Hoda teach away from each other. There is therefore no suggestion present in Kurz or Hoda to combine these references.

There is further no suggestion or incentive that would lead one skilled in the art to combine Kurz, Leach, and Engstrom with Hoda to provide a ceramic composition having closed cell structure, and the desired properties of the instant claims the instant specification. The courts have held that "[i]f the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The courts have also held that '[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the

teachings of the references are not sufficient to render the claims prima facie obvious.'" *In re Ratti* 270 F. 2d 810, 123 USPQ 349 (CCPA 1959).

Furthermore, Hoda clearly teaches the undesirability of pore-generating compounds, in contrast to Kurz, Leach, and Engstrom. Hoda teaches removal of carbonate containing impurities by extracting with an acid solution. Col. 3, lines 46-50. Hoda also teaches the undesirability of a "foamed glassy material" caused by evolution of steam and CO_2 from dehydroxylization, burning of carbonaceous materials, and decomposition of carbonates, where this "undesirable phenomenon" which occurs at temperatures above 1,100°C "is believed to be due to impurities in the clay such as organic impurities and carbonates, and these bubbles decrease strength and impact resistance. Col 2, lines 6-11; Col. 5,lines 33-37. Hoda therefore not only teaches modification of the bentonite clay to a "useful" form, but clearly teaches the undesirability of pore-formation in the vitrified matrix. As the modified bentonite of Hoda is optimized and specifically treated to avoid pore formation, there is no reasonable expectation that the inclusion of the modified bentonite of Hoda would be useful in the application of Kurz as suggested by the Examiner. *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989) ("Although the Commissioner suggests that [the structure in the primary art reference] could readily be modified to form the [claimed] structure, '[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification'") (citation omitted); *In re Stencel*, 828 F.2d 751, 755, 4 U.S.P.Q.2d 1071, 1073 (Fed. Cir. 1987) (obviousness cannot be established "by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion that the combination be made"). In light of the above-described teachings of Hoda, there is no teaching or suggestion to combine elements of the prior art to produce the present invention.

Thus, for at least the above reasons, there is no suggestion that would lead one skilled in the art to combine Hoda with Kurz, Leach and Engstrom, with any reasonable expectation for successfully providing the composition of Claim 1. Reconsideration and allowance of the claims is respectfully requested.

Claims 14-15 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Kurz in view of Leach, Engstrom and Hoda as applied to claim 1 above, and further in view of

U.S. Patent No. 3,727,838 ("Bergh"). In addition, Claim 16 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Kurz in view of Leach, Engstrom, and Hoda as applied to claim 1 above, and further in view of further in view of Romanian Patent No. RO 114015 ("RO '015"). Applicants respectfully traverse both of these rejections.

As described above, there is no suggestion in Hoda or Kurz that would lead one skilled in the art to modify any combination of Kurz, Leach, and Engstrom with Hoda, or with a reasonable expectation for success. Thus, these rejections over Claims 14-16 are moot, as Bergh and RO '015 each fail to remedy the deficiencies of Kurz, Leach, Engstrom and Hoda regarding the composition of the clay material, and hence the combinations of any of these references fail to disclose or teach all elements of the composition of Claim 1. Accordingly, the cited art fails to render the instant claims unpatentable. Reconsideration and allowance of these claims (Claims 14-16) is respectfully requested.

Therefore, the cited references, alone or in combination, fail to teach or disclose all limitations of the instant claims, and the combinations do not provide a teaching or suggestion that would motivate one skilled in the art to modify the references to provide the claimed invention.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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